U-Model Based Adaptive IMC For Nonlinear Dynamic Plants

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Summary

A novel technique, involving U-model based IMC (internal model control), is proposed for the adaptive control of nonlinear dynamic plants. The proposed scheme combines the robustness of the IMC and the ability of neural networks to identify arbitrary nonlinear functions, with the control-oriented nature of the U-model to achieve adaptive tracking of stable nonlinear plants. The proposed structure has a more general appeal than many other schemes involving polynomial NARMAX (nonlinear autoregressive moving average with exogenous inputs) model and the Hammerstein model, etc. Additionally, the control law is shown to be more simplistic in nature. The effectiveness of the proposed scheme is demonstrated with the help of simulations for the adaptive control of the Hammerstein model.